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OUTLINE OF AGRICULTURE

FOR

The Elementary Schools of Pennsylvania

PREPARED BY

The Department of Public Instruction

1912.

HARRISBURG:

C. E. AUGHINBAUGH, PRINTER TO THE STATE OF PENNSYLVANIA
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D. 21

ELEMENTARY AGRICULTURE.

Seventh and Eighth Grades.

"At the head of all sciences and arts, at the head of civilization and progress, stands—not militarism, the science that kills, not commerce, the art that accumulates wealth—but agriculture, the mother of all industry, and the maintainer of human life"—Garfield.

"The service science has rendered in recent years in many lines has convinced thinking men that a man must know something about soils and fertilizers if he is to get the best crops the soil is capable of growing; that he must know something about breeding and selecting plants if he is to have the plants best suited to his soil; that he must know something about the diseases and insects that prey upon his plants if he is to make an effective fight against them; that he must know something of the composition of feeds on the principles of nutrition, if he is to secure the best results in the production of beef, pork, dairy products, or animal power, for his feeds; that he must know something of the laws of heredity before he can improve his herds to the best advantage; that he must know something about the proper care of the human body and the disease that prevents efficient work; that he must have the stimulant of high ideals."—W. R. Dodson.

The public schools can do much to create in the coming generation the desire to know more about the fundamental principles underlying agricultural practices. With the desire created, the attitude of the people a receptive one, the information can be readily imparted, and much is already at hand. Moreover, it is through the public schools that the masses of the people can be reached.

The purpose of the following outline in agriculture is to give help to the teacher. It is not to be expected that every school in the State will do all the work that is here outlined, while there are many schools that will carry out more exercises than are here given. The conditions are so different in the various parts of the State that a course in agriculture must be more or less flexible. In sections of the State where tobacco is grown, more emphasis should be placed upon this subject than in sections where it is not grown. The same applies to dairying. In the mining and other industrial sections much more attention should be given to vegetable gardening, and to the sanitation of the home, and the improvement of the school and home grounds. Right here is a wonderful opportunity for the schools in these districts.

The course as outlined provides for two years' work, and it is arranged so far as possible according to the sequence of seasons. It is designed for the seventh and eighth grades. In the rural schools

these two grades should be combined in one class, saving the time of the teacher, and giving more inspiration by making the class a little larger.

The class in Agriculture should recite three times a week, Mondays, Wednesdays and Fridays being the best arrangement. Some of these periods should be taken up with the exercises and experiments, while at other times a portion of the noon hour should be utilized for this very pleasant work.

A good text book should be in the hands of each pupil in the class, while the teacher should have several agricultural books on his desk. (See list of books at the end of outline.) There should be several farm papers and magazines in the school for the use of the teacher and pupils. Some of the publishers of agricultural papers are glad to have one of the pupils in the school act as agent in securing subscriptions and will give the school a free copy. Work this up and you will be doing your community a service.

Do not confine yourself to the text book. It is necessary for good work, yet there must be actual observations and operations to supplement it. It is not always best to follow the order of subjects as given in the texts. Perhaps this outline will help you in this respect.

Aim to get something definite accomplished each year. This subject gives an excellent opportunity to bring school and home closer together. By means of your study of corn and the corn club, increase the yield per acre in your locality. In your study of apples, use one or two new varieties that are suited to the region.

Get something definite done each year towards the improvement of the school house and yard. Get as many pupils as you can to do at least one thing each year to make their homes more attractive. Just think what this will accomplish in a very few years if carried out consistently by every teacher. Now do your part. You will never regret it, for it will pay you good returns.

Make the corn club a success from the start. Other clubs can be started later, but focus all your energy on the corn club for the boys and a sewing club for the girls. Other schools are doing it. Do not let your school fall behind.

Read over the outline, make a list of the bulletins mentioned in the references, and send for them all at the beginning of the year. Be sure to secure the set of "economic seeds." Save all of the work done by the class and have a school exhibit at the time of the corn show or at some other suitable time.

Be sure to get pupils into the habit of making careful records of all observations and experiments made.

The Expert Assistant of Agricultural Education of the Department of Public Instruction at Harrisburg, Pa., will be glad to help you in any way possible.

Keep in touch with the School of Agriculture of the Pennsylvania State College, State College, Pa., and make use of every good agriculturist that comes your way, by having him give a talk to your school.

OUTLINE FOR 1912-1913.

THE NATURE OF PLANTS.

Root hairs, roots, stems, leaves, flower, fruit, cambium, layer, how plants feed, sap current, propagation by buds, grafts, seeds, sprouts, bulbs, cuttings, plant food, air moisture.

Suggestive Exercises.

1. For study of roots and root hairs, germinate corn between two pieces of wet blotting paper (should be prepared at least a week in advance).

2. Study corn plant, wheat plant and oats plant, making drawing of each, including the roots.

3. Make a cross-section of a small branch or twig of a tree, showing bark, cambium layer, annular rings and heartwood.

References.

Any good botany text.

Agricultural texts in list of books at the end of this outline.

FARM CROPS.

CORN.

Study of plant, soil, cultivation, count the barren stalks and vacant hills, selection of seed in the field, judging corn, storage of seed corn, germination, planting, fertilizers, varieties, insect pests, fungous diseases and control of same.

Suggestive Exercises.

1. Take class into field and count barren stalks and empty hills. Estimate the loss per acre by getting the loss in a given area.

2. Take class into the field and select seed corn there.

3. Form a boys' corn club and have each one of them select his own corn in the field at home, and store it properly at home. Have them keep a record of all that they do from the selection of seed in the fall until the contest the following year.

4. Have as many boys as will bring ten ears a piece from home and have a little corn show of your own. Have a public program, including essays on corn, and invite the parents to be present. Have an exercise in judging corn.

5. The winner in each local corn club should exhibit his corn at the County Fair in a county contest arranged by the County Superintendent, or at some other place arranged by him.

6. The winner in the County Contest should send exhibit to the Pennsylvania State College to be entered in the State Contest.

7. Conduct germination test. Have each boy in the corn club test his own corn and select his own seed. (This exercise should be done in early spring).

References.

Agricultural texts—See appended list.

The production of good seed corn, No. 229.

School lessons in corn, No. 409.

Corn cultivation, No. 414.

Seed corn, No. 415.

School exercises with corn, Pennsylvania State College Bulletin.

Farmers' Bulletins.—U. S.
Dept. of Agriculture.

WHEAT.

Study of plant, kinds of wheat, distribution, value as food, soil, culture, place in rotation, fertilizer, weeds, fungous diseases, insect enemies, time of seeding and time of ripening, harvesting, storing, marketing.

Suggestive Exercises.

1. Make a study of the plant and make drawing of same.

2. Formulate problems for arithmetic class based upon cost of production, marketing, yield, etc.

References.

Agricultural texts—See appended list.

Cereals in American Hunt.—See appended list.

OATS.

Study of plant, distribution, value, soil, culture, rotation, fertilizers, weeds, fungous diseases, insect enemies, harvesting, marketing.

Suggestive Exercises.

Same as for wheat.

References.

Same as for wheat.

RYE, BARLEY, BUCKWHEAT.

Same as for wheat.

GRASSES.

Same as for wheat.

LEGUMES.

Study of two or three of the most important, clover, alfalfa, vetch, study plant of each, including the roots, tubercles or nodules, bacteria, soil, culture, inoculation of new soil, fertilizers, lime, harvesting, plowing under, source of nitrogen.

Suggestive Exercises:

1. Take class into field and dig up roots of a legume. Point out the nodules.
2. Compare the different legumes growing in the fields.
3. Make drawings of each, showing the nodules on roots.
4. Collect roots of the different legumes and put in bottles containing water or alcohol.

References.

Same as for wheat.

VEGETABLE GARDEN.

PREPARATION OF SOIL.

Fertilizers, time of planting various vegetables, care of each, cultivation, time of ripening, economy of space, late crops take place occupied by early crop, variety of vegetables, care required, cold frames and hot beds, flower garden.

Suggestive Exercises:

1. In industrial sections where farming is not prominent, this topic should be well developed. Secure ground, if possible, for children's garden, each pupil having plot eight feet by five feet or larger. Award prize for best garden. School should furnish seed.
2. Have pupils start garden at home. Offer prize for best home garden. Have pupils keep record of all vegetables harvested and their value.
3. Encourage the improvement of the home yard, both front yard and rear yard. Prizes should be awarded for the biggest improvement brought about in a yard in any one season.
4. School yard must be made neat and attractive as an example. Much of this work should be done by the pupils. An energetic teacher will be gratefully surprised at the amount of good that can be accomplished in one or two years.

References.

Vegetable gardening—R. L. Watts.

Principles of Vegetable gardening—Bailey.

Catalogs of good seed firms.

The home vegetables garden—Farmers' Bulletin No. 255 U. S. Dept. of Agriculture, Washington, D. C.

TOBACCO.

Study of plant, value and use, soil, climate, types, planting, transplanting, cultivation, flower bud, suckers, harvesting, curing, sorting, grading.

Suggestive Exercises:

1. Take class into tobacco field and see growing crop. Note soil, culture, etc. Ascertain what fertilizer was used. Compare this field with one belonging to another farmer, noting the above points.

References.

Agricultural texts—See appended list.

The culture of tobacco—Farmers' Bulletin No. 82.

Tobacco soils—Farmers' Bulletin No. 82.

Principles and practical methods of curing tobacco—Farmers' Bulletin No. 143.

POTATOES.

Soil, propagation, selection of seed, culture, standard varieties for local community, fertilizers, fungous diseases and insect enemies with methods of control.

References.

The Potato—Frazer.

Potato—Farmers' Bulletins Nos. 37, 147, 244, 365, Dept. of Agriculture, Washington, D. C.

SOILS.

Origin, kinds, size of particles, glacial, humus, moisture and air of the soil, purpose and effect of cultivation, moisture-retaining capacities of the various

soils, effect of humus and lime, soil capillarity, drainage, irrigation, tillage implements, use of roller, surface soil, sub-soil.

Suggestive Exercises:

1. Collect samples of various soils and place in jars or bottles. Make a study of them.
2. Carefully break the bottom out of four bottles. Invert them and tie cloth over the mouth of each. Fill them with sand, loam, clay, and leaf mould respectively. Under each place a glass. Into the top of each pour equal amounts of water (about half a glass). Notice which soil loses the most water and the most rapidly.

References.

- Agricultural texts—See appended list.
 Management of soil to conserve moisture—Farmers' Bulletin No. 226.
 Soils, S. W. Fletcher—See appended list.
 Soils, Burkett,—See appended list.
 The management of heavy clay soils—Farmers' Bulletin No. 202.
 The improvement of sandy soils—Farmers' Bulletin No. 204.

PLANT FOOD.

How plants feed, source of plant food, air, moisture, the elements, farm manures, care and handling of manure, commercial fertilizers, how to purchase, how to mix, when and how to add fertilizers to the soil, use of lime, legumes as source of nitrogen.

Suggestive Exercises:

1. Secure samples of fertilizers to show to the class.
2. Bring some fertilizer sacks to the class and have pupils read the labels on them. Explain same.

References.

- Agricultural texts—See appended list.
 Commercial fertilizer No. 44. } Farmers' Bulletins U. S.
 Barnyard Manure No. 192. } Dept of Agriculture
 Home mixing of fertilizers No. 222-225. } Washington, D. C.

CROP ROTATION.

Need of rotation, soil depletion, restoring fertility, advantages of rotation, systems of rotation, fungous diseases and insect pests in relation to rotation, use of legumes in rotation system.

Suggestive Exercises:

1. Point out the rotation in the fields near the school house.
2. Have pupils note the rotation of at least two fields on the home farm and bring report of same to class. Have them report the rotations in use at home with the reasons for same.

Reference.

- Agricultural texts—See appended list.

CO-OPERATION.

Principle of co-operation, what it means to the farmer, Farmers' Clubs, the Grange, the individuals duty to the community, to the school, to the church.

Suggestive Exercises:

1. Have pupils arrange a public program consisting largely of Agricultural topics, this program to be given before the local farmers' club or grange, or in co-operation with them.

ROADS.

Essentials of a good road, good foundation, rounded surface, ditches, good drainage, use of split-log drag.

Suggestive Exercises:

1. Have one of the older boys make a split-log drag. Get the older boys to agree to drag the road for a quarter mile on either side of the school house during the entire session.

References.

- Fundamentals of agriculture—Halligan. }
 Good roads for farmers—Bulletin 95. } Farmers' Bulletins Dept.
 Earth Roads—Bulletin 136. } of Agriculture, Washing-
 The use of split log-drag on earth }
 roads Bulletin 321. } ton, D. C.

CHESTNUT BLIGHT.

History and distribution, economic importance, appearance, and effect on tree, method of infection, means of spreading, how controlled, The Chestnut Blight Commission in Penna.

Suggestive exercise:

1. If there are chestnut trees in your locality, examine them for the chestnut bark disease. Let the school be the center of information in regard to the presence or spread of the disease in your locality.

References.

The control of the Chestnut Bark Disease—Farmers' Bulletin No. 467, U. S. Dept. of Agriculture, Washington, D. C.

For recent information, write to S. B. Detweiler of the Chestnut Blight Commission, 1112 Morris Bldg., Philadelphia, Pa.

APPLES.

Chief varieties adapted to the locality, propagation by grafting and budding, top grafting, soil, drainage, exposure, distance to plant, pruning, cultivation, interplanting, intercropping cover crops, picking, boxing and barreling, storing, marketing, fungous diseases, insect enemies, spraying.

Suggestive Exercises:

1. With class visit an orchard. Point out correct and incorrect methods of pruning. Have members of class cut off a few limbs in correct manner. Look for scale insects and codling moth cocoons.

2. Have members of class top graft, first on models in class and then on some tree near the school house. Finally get each pupil to top graft some good variety on at least one of the trees at his home.

3. Send to some good nursery firm and buy enough seedlings so that each one in the class will have, at least six. Secure good cions from a tree of a good variety growing in the neighborhood, or, better yet, send to the nursery firm for cions of a variety that is adapted to the locality. Two or three varieties might be used instead of one. The purpose of this exercise is to teach the propagation of the apple and also to start some new trees in the locality. Have pupils root graft the trees carefully using the waxed string (This can be purchased also). Then have each pupil take his tree home and plant it, being careful not to let the roots dry out. Keep a record of the number of these trees that grow.

4. Take class into an orchard where some farmer is spraying, or get the farmer to bring his spraying machine to the school house for a demonstration.

References.

Agricultural texts—See appended list.

The Apple and How to Grow it.—Farmers' Bulletin No. 113, U. S. Dept.

of Agriculture, Washington, D. C.

The Apple in Pennsylvania—The Penna. State College Agricultural

Experiment Station.

OTHER TREE FRUITS.

Same as for apples.

SMALL FRUITS.

Chief varieties only, method of propagation, soil preparation, culture, harvesting and marketing.

TREES.

Study common trees of the locality, leaves, bark, winter buds, seeds, wood structure, annular rings, windbreaks, care of farm woodlot, fungous growth on trees, proper methods of planting and pruning, value on school grounds and home grounds, uses.

Suggestive Exercises:

1. Take class out to the trees. Study them out of doors. Notice character, istic shape, method of branching, bark, leaves, and buds. The power of observation will be improved if pupils draw the various parts noted.

2. Make collection of leaves and cross-sections of wood and bark.

3. Plant at least one tree on the school grounds every Arbor Day. In addition to this do something every year to make the school grounds more attractive.

References.

Agricultural texts—See appended list

Primer of Forestry part I—Farmers' Bulletin No. 173, U. S. Dept of

Agriculture, Washington, D. C.

Arbor Day Manual—Dept. of Public Instruction, Harrisburg, Pa.

SCHOOL AND FARM HOME.

Attractive buildings, inside and outside, look up school law in regard to floor space, air space, lighting, heating and ventilating, lawn, shrubbery, flowers, trees, sanitary and inconspicuous out houses concealed by shrubs and trees, playgrounds, home a place of beauty, lawn shrubbery, flowers, no rubbish around, drainage, insect breeding places, sanitation.

Suggestive Exercises:

1. Each year do something to make the school house and school yard more attractive. The pupils will gladly help. Be determined to make the place so attractive that the community will take especial pride in it. You can accomplish wonders in the space of two or three years, a little each year.

2. Each Arbor Day plant a few trees and shrubs. Have an Arbor Day program.

3. Try to have each pupil do something at home on each Arbor Day that will make the home grounds more attractive.

References.

Agricultural texts—See appended list.

Beautifying the Home Grounds—Farmers' Bulletin No. 185, U. S. Dept. of Agriculture, Washington, D. C.

Planning and Adorning the Homestead—Iowa State College Agricultural Experiment Station, Ames, Iowa.

Arbor Day Manual—Dept. of Public Instruction, Harrisburg, Pa.

BOYS' AND GIRLS' CLUBS.—CONTESTS.

Corn club for boys, Potato club, cooking and sewing club for girls. The underlying principle back of these clubs is to have the boys and girls do all the work themselves. In all experiments or contests complete records of what has been done should be a part of the requirements.

Suggestive Exercises:

1. Hold fruit and vegetable show in the fall. Combine with this the work done by the girls.

2. Hold a corn show. This may be combined with the other show.

3. Do not give cash prizes. Local winners should compete in a county contest. Winners in county contest should compete in a state contest held at State College.

4. Have annual exhibit of cooking, canning and sewing done by the girls. Combine this with the corn show of the boys and make a neighborhood affair of it.

Reference.

Boys' and Girls, Agricultural Clubs—Farmers' Bulletin No. 385, U. S. Dept. of Agriculture.

OUTLINE FOR 1913-1914.

BIRDS.

A study of the common species of the locality, life history, habitat, food, why beneficial to the farmer, learn to know a few every year, by song, sight or flight.

Suggestive Exercises:

1. For a noon or afternoon walk go to some nearby trees or grove and closely observe some birds. Make it a point to learn to know a few birds well, and then increase the number.

2. Keep a bird chart, showing birds of the locality, time of migration, of those who leave, and date first seen in spring.

References.

Nature Study—Hodge.

Some common birds—Farmers' Bulletin No. 54, U. S. Dept. of Agriculture.

THE HOUSE FLY AND MOSQUITOES.

Study of fly itself, life history, breeding places, as a carrier of disease, need of protection from them, how to get rid of them.

Study of the mosquito, life history, breeding places, carrier of disease, need of protection from them, how to get rid of them, Havana, Cuba and the Panama Canal Zone as examples of what can be done.

Suggestive Exercises:

1. Study fly and mosquito under hand lens if possible.

2. Join the "fly-swatters" in the spring.

References.

Agricultural texts—See appended list.

The House Fly—Farmers' Bulletin No.

How Insects affect Rural Health—Farmers' Bulletin No. 155, U. S. Dept. of Agriculture, Washington, D. C.

BEEES.

The bee a social insect, division of work, food, cross pollination, swarming, honey, beeswax, care of bees.

Suggestive Exercises:

1. Observe bees gathering honey and pollen.
2. Visit an apiary on a sunshiny day.

References.

How to keep Bees—Comstock.

A B C and X Y Z of Bee Culture.

Beekeeping—Farmers' Bulletin No. 59, U. S. Dept. of Agriculture.

Bees—Farmers' Bulletin No. 447, U. S. Dept. of Agriculture.

CORN.

Same as for 1912-1913. Two or three new varieties submitted by the State College or by the Department of Agriculture at Washington, D. C. might be tried out the coming spring.

WEEDS.

How to kill them, recognition of at least ten of the most common weeds in the locality.

Suggestive Exercises:

1. After studying weeds take a walk through the fields and point out at least ten common weeds. Trace them up in botany manual.
2. Make a collection of weed and crop seeds in small bottles properly labelled.

3. Secure a school set of Economic seeds. These may be obtained at a nominal expense by writing to the Seed Laboratory, United States Dept. of Agriculture, Washington, D. C.

References.

Agricultural texts—See appended list.

Weeds and How to Kill Them—Farmers' Bulletin No. 28, U. S. Dept. of Agriculture.

SWINE

Lard type, bacon type, characteristics of breeds of each type, profit in hog raising, butchering, packing houses, by-products.

Suggestive Exercises.

1. Make a list of the various breeds in the locality.
2. Compute the profit in raising a hog.
3. Have members of class attend a hog butchering and write compositions describing what they saw.

References.

Agricultural texts—See appended list.

Types and Breeds of Farm Animals—Plumb.

DAIRYING.

Chief breeds of dairy cows, characteristics, care of the cow, composition of milk, testing of milk cream, the separator, butter, value of cleanliness, bacteria, care of milk, butter, cheese.

Suggestive Exercises:

1. Have pupils make a list of all cows in the locality and note how many of each breed.
2. Have each pupil figure out the cost of keeping one of the cows at home. Also estimate the revenue derived from that same cow, and see whether it pays to keep her.
3. Have each pupil describe how the milk and butter are handled at home. Emphasize the necessity for cleanliness.
4. If possible, get a Babcock tester and have pupils test the milk of the cows in the community.

References.

Agricultural texts—See appended list.

The care of Milk and its Use in the Home—Farmers' Bulletin No. 413, U. S. Dept. of Agriculture, Washington, D. C.

The Babcock Test and How to Use it—The University of Wisconsin Agricultural Experiment Station, Madison, Wis.

CATTLE.

Types and breeds with chief characteristics of each, use of score card, names of various parts of the body, different cuts of meat, care, feed, housing.

Suggestive Exercises:

1. Have pupils make a list of the various breeds in the neighborhood.
2. Have pupils figure out cost of keeping and feeding a steer, and the profit derived therefrom.

References.

Agricultural texts—See appended list.

Types and Breeds of Farm Animals—Plumb.

Essentials of Beef Production—Farmers' Bulletin No. 71, U. S. Dept. of Agriculture.

FEEDS AND FEEDING.

Purpose of feeding, classes of feeds, various feeds, natural feed-, stock food, balanced ration.

Suggestive Exercises:

1. Bring some ensilage to class and make a study of it.
2. Secure some samples of commercial feeds and explain analysis of same.

References.

Agricultural texts—See appended list.

Feeds and Feeding—Henry.

TUBERCULOSIS IN CATTLE.

Nature and history of disease, its importance, symptoms, spread of disease, the tuberculin test, suppression of the disease, sanitation.

Suggestive Exercises:

1. Have pupils examine cattle at home for symptoms of the disease. It is often present where it is not known.

Reference.

Tuberculosis—Farmer's Bulletin No. 473, U. S. Dept. of Agriculture.

SHEEP.

History, types and breeds with characteristics, care, feed, disease.

Suggestive Exercises:

1. Have class make a list of the number and breeds of sheep in the locality.

References.

Agricultural texts—See appended list.

Types and Breeds of Farm Animals—Plumb.

HORSES.

Types of horses, breeds, names of various parts of body, care, how to tell age, feed, important diseases and their remedies, care of harness.

Suggestive Exercises:

1. Have pupils determine the age of the horses at home.
2. Have one of the pupils bring a horse to the school so that the various parts of the body may be located. Point out the strong points and the weak points. Determine the age of the horse.

References.

Agricultural texts—See appended list.

Types and Breeds of Farm Animals—Plumb.

POULTRY

Different types, housing, feed, incubators, brooders, cost of keeping flock, revenue from same.

Suggestive Exercises:

1. Have pupils bring one each of the different breeds in the locality. Have slatted box ready for them. They can be studied and compared in this box. Show why one is a better meat breed than another, and why one is a general purpose breed.

2. Have pupils figure up the cost of keeping the home flock, and the revenue derived. Does every chicken in the flock pay for its keep?

References.

Agricultural texts—See appended list.

Bulletin 107, Pa. State College, School of Agriculture.

Poultry Raising on the Farm—Farmers' Bulletin No. 141, U. S. Dept. of Agriculture.

FARM MANAGEMENT.

Planning farms, proper location of various buildings, arrangement of fields, rotation of crops, housing and care of livestock, fences, influence of market, climate and soil, farm accounts, marketing, care of machinery, co-operation.

Suggestive Exercises:

1. Have each pupil make a plan of the home farm. Keep it for your next school exhibit.

2. Have pupils relate instances showing how it has paid their fathers to co-operate with his neighbors.

References.

Agricultural texts—See appended list.

FARM MACHINERY.

Care of tools and machinery, machines for various crops, parts of the machines, oiling, shelter.

Suggestive Exercises:

1. Secure catalogs of two or three good implement firms (free). Use them in class.

References.

Agricultural texts—See appended list.

FARM BOOK-KEEPING.

Value, simple methods for keeping records of expenditures and receipts, record of expense and income of a cow, poultry, etc.

Suggestive Exercises:

1. Have each pupil keep a record of cost of keeping one cow at home and the receipts derived from same. This exercise is the most valuable if the record of two cows are kept, one being of the best cows in the herd and the other one of the poorest.

2. Estimate the cost of producing a crop from one of the fields, getting the facts from the owner of the field. Figure out the profit. Each pupil can take one of the crops of his own home farm.

References.

Agricultural texts—See appended list.

Correspondence Course, School of Agriculture, Pa., State College.

CO-OPERATION.

Same as 1912-1913.

ROADS.

Same as 1912-1913.

SCHOOL AND FARM HOME.

Same as 1912-1913.

BOYS' AND GIRLS' CLUBS.

Same as 1912-1913.

TEXTS SUITABLE FOR ELEMENTARY SCHOOLS.

Beginnings in Agriculture—Mann—Macmillan Co.

Agriculture for Beginners—Burkett, Stevens & Hill—Ginn & Co.

Productive Farming—K. C. Davis—Lippincott Co.

Agriculture for Young Folks—Wilson & Wilson—Webb Publishing Co.

First Principles of Agriculture—Goff & Mayne—American Book Co.

An Introduction to Agriculture—Upham—Appleton & Co.

Agriculture for Common Schools—Fisher & Cotton—Chas. Scribner's Sons.

Elements of Agriculture—Hatch & Haslewood—Row, Peterson & Co.

REFERENCE BOOKS.

- Elements of Agriculture—Warren—Macmillan Co.
 Fundamentals of Agriculture—Halligan—D. C. Heath & Co.
 Principles of Agriculture—Bailey—Macmillan Co.
 Agriculture through the Laboratory and School Garden—Jackson
 & Daugherty—Orange Judd Co.
 Cereals in America—Hunt—Orange Judd Co.
 Vegetable Gardening—R. L. Watts—Orange Judd Co.
 Principles of Vegetable Gardening—Bailey—Macmillan Co.
 The Potato—Frazer—Orange Judd Co.
 Soils—S. W. Fletcher—Doubleday, Page & Co.
 Soils—Burkett—Orange Judd Co.
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